

## CLAIMS

What is claimed is:

1. A code division multiple access base station for use in receiving a plurality of data signals received over a shared spectrum, each received data signal experiencing a similar channel response, the base station comprising:

means for receiving a combined signal of the received data signals over the shared spectrum;

means for sampling the combined signal at a multiple of a chip rate of the combined signal;

means for estimating a channel response for the combined signal at the multiple of the chip rate;

means for determining a column of a channel correlation matrix using the estimated channel response;

means for determining a spread data vector using the determined column, the estimated channel response, the received combined signal and a fourier transform; and

means for estimating data of the data signals using the spread data vector.

2. The base station of claim 1 wherein the determined column is a first column of the channel correlation matrix.

3. The base station of claim 1 wherein a length of an impulse response of the combined signal is  $W$  and the determined column is at least  $W - 1$  columns from edges of the channel correlation matrix.

4. The base station of claim 1 wherein the determining the spread data vector uses a fourier transform of a hermetian of a channel response matrix multiplied by the received

combined signal.

5. The base station of claim 1 wherein the determining the spread data vector uses a fourier transform of the determined column.

6. The base station of claim 5 wherein the determined column fourier transform is multiplied by a number of spread chips transmitted in the data signals.

7. The base station of claim 1 wherein the fourier transform is a fast fourier transform.

8. The base station of claim 1 wherein the spread data vector determining further uses an inverse fast fourier transform.

9. A code division multiple access base station for use in receiving a plurality of data signals received over a shared spectrum, each received data signal experiencing a similar channel response, the base station comprising:

an antenna for receiving a combined signal of the received data signals over the shared spectrum;

a sampling device for sampling the combined signal at a multiple of a chip rate of the received data signals;

a channel estimation device for estimating a channel response for the combined signal at the multiple of the chip rate; and

a single user detection device for determining a column of a channel correlation matrix using the estimated channel response, and for determining a spread data vector using the determined column, the estimated channel response, the received combined signal and a fourier transform; and

wherein data of the data signals is estimated from the spread data vector.

10. The base station of claim 9 wherein the determined column is a first column of the channel correlation matrix.

11. The base station of claim 9 wherein a length of an impulse response of the combined signal is  $W$  and the determined column is at least  $W - 1$  columns from edges of the channel correlation matrix.

12. The base station of claim 9 wherein the determining the spread data vector uses a fourier transform of a hermetian of a channel response matrix multiplied by the received combined signal.

13. The base station of claim 9 wherein the determining the spread data vector uses a fourier transform of the determined column.

14. The base station of claim 13 wherein the determined column fourier transform is multiplied by a number of spread chips transmitted in the data signals.

15. The base station of claim 9 wherein the fourier transform is a fast fourier transform.

16. The base station of claim 9 wherein the spread data vector determining further uses an inverse fast fourier transform.